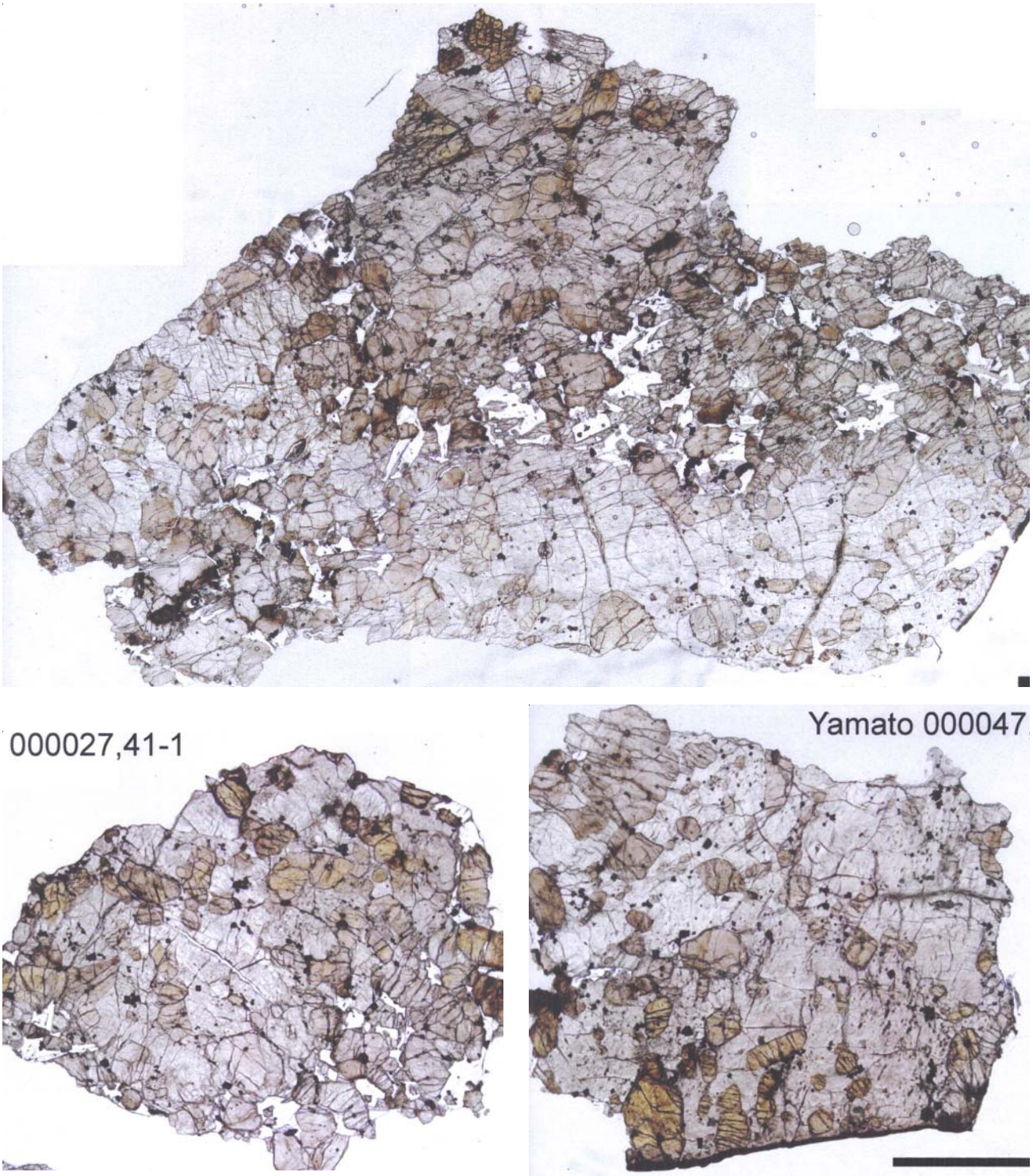
Y000027, 47, 97

Lherzolitic shergottite

9.68, 5.34, 24.48 grams



Figures 1 a, b, c: Photomicrographs of thin sections of Y000097 (top), and Y000027 and Y000047 (all to different scale, but 97 is about 1 cm across). From Misawa and Kojima.

Introduction

Yamato 000027, Y000047 and Y000097 were found in November 2000 on bare ice a few km north of the northern end of the JARE IV nunataks (Kojima 2006; Misawa et al. 2006). These three small samples are considered "paired" because they have similar texture and were found in the sample place. Their distintive poikilitic texture, rare gas sigantures and oxygen isotopic composition prove they are Martian in orgin.

Petrography

Mikouchi and Kurihara (2007) and Imae and Ikeda (2007) describe Y000027, 47, 97 as poikilitic, lhersolitic shergottites. Regions of large poikilitic pyroxene (up to 8 mm) with smaller rounded olivine and chromite chadocrysts are seperated by interstitial pyroxene and plagioclase (figure 1). Pyroxene cyrstals zone continuously from the poikilitic regions extending into the interstitial regions. The nonpoikilitic interstitial regions also contain ilmenite, merrilite, ulvospinel, Cl-apatite and sulfide

Ikeda and Imae (2007) studied the magmatic inclusions found in olivine, pyroxene, chromite and ilmenite grains. Glasses found in these inclusions show a wide range of chemical composition.

A 2 mm thick vein of shock melt penetrates Y000027. Imae and Ikeda (2007) identified high-pressure phases including "akimotoite".

Chemistry

Shirai and Ebihara (2007) found that the composition of Y000097 was similar to that of ALHA77005 and LEW88516. The light REE are depleted compared with the heavy REE.

Radiogenic age dating

Misawa et al. (2008) have dated the time of crystallization as 189 ± 18 m.y. by the Rb/Sr technique (figure 3).

Cosmogenic isotopes and exposure ages

Nagao et al. (2007) determined the composition and isotopic ratios of rare gases from Y000027 and 97 and determined an exposure history to cosmic rays of 4.9 m.a.

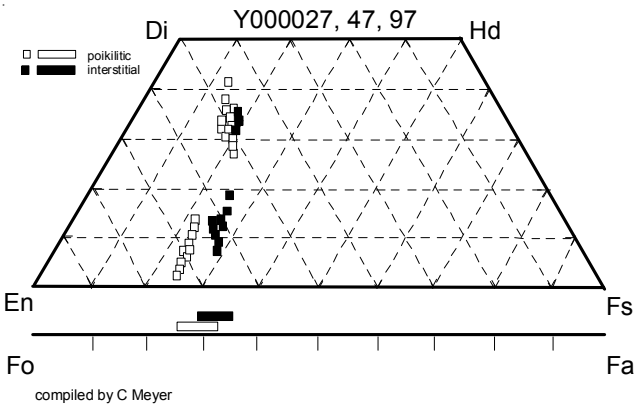


Figure 2: Summary olivine and pyroxene composition diagram for poikilitic and non-poikilitic areas of Y000027, 47 ,97 (compiled from data by Mikouchi and Kurihara 2008 and Imae and Ikeda 2008, with appologies).

Mineralogical Mode of Y000027

	Poikilitic	Interstitial
Olivine	27 %	35
Pyroxene	69	55
Plagioclase		9
Chromite	tr.	9
Ilmenite		tr.
Pyrrhotite		tr.
Merrillite		tr.
Cl-apatite		tr.
Baddelyite		tr.

Other Studies

Oxygen isotopes for all three samples were reported by Misawa et al. (2006).

Hoffmann et al. (2007) studied the magneitc properties of Y000097.

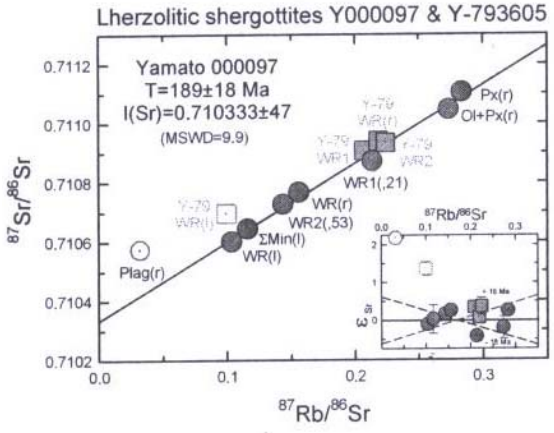


Figure 3: Rb-Sr iscochron diagram for Y000097 (from Misawa et al. 2007).

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